TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION
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Short Bolts Offer Better Hardwood Utilization

Log scale was increased one-fourth by cutting 52-inch bolts instead of standard logs in a beech utilization experiment in southern Michigan. These results were obtained from a study of the yields by grade of dimension stock sawn from short beech bolts. Since identical scaling procedures could be used for both logs and bolts, the study also provided an opportunity to compare the log scale of the bolts with the scale of the standard logs that could have been cut from the same trees.

Thirty-three trees 11 to 19 inches in diameter were felled in an improvement cut of a mixed hardwood stand owned by the Michigan Department of Conservation. Tree-length logs were skidded to a landing and bucked into 52-inch bolts (plus a 1-inch trim allowance). All surface defects on all four faces were diagrammed on a form designed for this purpose. As the bolts were cut, the average end d.i.b. (diameter inside bark) was measured to the nearest 0.1 inch and the size and kind of end defects diagrammed. Bolts were taken to a minimum top d.i.b. of 7 inches; long butts and cull sections of varying lengths were discarded. The net bolt scale was 3,054 board-feet (see table on back of sheet).

On the log diagrams, standard logs 8 feet or more in length to a minimum top d.i.b. of 8 inches were marked out without regard for the actual bucking cuts made for bolts. According to the usual practice of cutting for grade, log lengths were adjusted to yield the maximum volume in Log Grades 1 and 2. Defective portions of the bole were thrown into the next log or discarded with the long butts. Merchantable sections of 8 feet or more above the cull sections were scaled and graded as standard logs. The net log scale was 2,469 board-feet, with Forest Products Hardwood Log Grades 1, 2, and 3 yielding 14, 60, and 26 percent respectively of the total.

The gain of 585 board-feet from cutting bolts came almost entirely from relatively clear sections of the tree that were too short for standard logs. The difference in minimum tops added only 11 board-feet to the bolt scale. The 18-inch tree showed less volume in gross bolt scale than log scale; in this case, the total bolt and log lengths of the tree were the same, and the taper assumed in the log rule was greater than actually occurred.

The results obtained in this study, and since then confirmed by two commercial operators, demonstrate that cutting short bolts for dimension stock from low-value hardwoods can increase total board-foot log scale by 20 to 25 percent.

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Table 1.--Comparison of standard log and bolt scales

Diameter at breast height (Inches)	Trees cut	Log scale[1/]		Bolt scale[1/]		Gain from bol	
		Gross	Net	Gross	Net	Gross	Ne
	Number	Board feet	Board feet	Board feet	Board feet	Percent	Perce
12	12	560	495	782	712	40	44
14	12	855	743	1,116	913	31	23
16	8	1,120	1,001	1,363	1,199	22	20
18	1	315	230	307	230	-3	0
Total	33	2,850	2,469	3,568	3,054	25	24

1/ International 1/4-inch rule.